

## ITCS 113 – Fundamentals of Programming

### Lecture 3: Extra Exercises

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**No Need to Submit but Practices (ALL) is encouraged.**

**Q1:** Determine the value of `total` and its counter (e.g. `i`) after each following loops is executed and the number of iterations (rounds) in .

Loops	# of iterations	Value of <i>counter</i> and <i>total</i>
<pre>int total=10; for(int i=0;i&lt;5;i++) {     total+=i; }</pre>	5	Loop #1: i=0, total = 10 Loop #2: i=1, total = 11 Loop #3: i=2, total = 13 Loop #4: i=3, total = 16 Loop #5: i=4, total = 20
<pre>int total = 1; for(int c=0;c&lt;8;c=c+2) {     total *= 2; }</pre>		
<pre>float total = 10.0; for(int j=10;j&gt;=6;j--) {     total=total/2; }</pre>		
<pre>float total = 10.0; int counter=-1; while(counter&lt;3){     total+=counter;     counter+=4; }</pre>		
<pre>int total = 4; int max=16; while(total&lt;=max){     total*=2; }</pre>		
<pre>char total = 'A'; char min='C'; while(total&lt;=(min+1)){     total++; }</pre>		

**Q2:** Write the program to show the sequence of “Seven-Up” game between 1 to  $n$ .

The “Seven-up” game has the following rules:

- The sequence starts from 1 to  $n$ ,
- If a number in the sequence is divisible by 7 or ending with 7, display "Seven-Up" instead of a number.

The program must receive an interger,  $n$  and display the “Seven-Up” sequence accordingly.

**Sample inputs and output**

#	Input	Expected Screen Output
1	30	<pre> 30 1 2 3 4 5 6 seven-up 8 9 10 11 12 13 seven-up 15 16 seven-up 18 19 20 seven- up 22 23 24 25 26 seven-up seven-up 29 30 </pre>

**Q3:** Write the C program to display a multiplication table of an integer  $x$  and the number of rows,  $y$ . The program takes two integer inputs:  $x$  and  $y$ . If  $x$  or  $y$  is negative number or zero, the program display “Unable to create a table”; otherwise, the program shows the multiplication table of  $x$ , from 1 to  $y$ .

Requirement: The program must use `while` loop

**Sample inputs and output**

#	Input	Output	Expected Screen Output
1	3 0	Unable to create a table	<pre> 3 0 Unable to create a table </pre>
2	5 8	<pre> 5*1=5 5*2=10 5*3=15 5*4=20 5*5=25 5*6=30 5*7=35 5*8=40 </pre>	<pre> 5 8 5*1=5 5*2=10 5*3=15 5*4=20 5*5=25 5*6=30 5*7=35 5*8=40 </pre>
3	-2 5	<pre> -2*1=-2 -2*2=-4 -2*3=-6 -2*4=-8 -2*5=-10 </pre>	<pre> -2 5 -2*1=-2 -2*2=-4 -2*3=-6 -2*4=-8 -2*5=-10 </pre>

**Q4:** Write a C program to count the number of integers in the given range,  $[x, y]$ , that can be divisible by  $d$ . The program takes three inputs:  $x$ ,  $y$ , and  $d$ :

- $x$  is the start number of the range (inclusive)
- $y$  is the ending number of the range (inclusive)
- $d$  is the divider

You can assume that all three inputs are always integers greater than 0 and  $x < y$ .

Requirement: The program must use `for` loop

#### Sample inputs and output

#	Input	Output	Expected Screen Output
1	5 21 3	6 9 12 15 18 21 count=6	5 21 3 6 9 12 15 18 21 count=6
2	-10 10 4	-8 -4 0 4 8 count=5	-10 10 4 -8 -4 0 4 8 count=5

**Q3:** Write the program to calculate the average score of a students given multiple homework. The program must repetitively take the input scores until receiving 'q' . Then, the program will calculate the average of the input scores, display the average of the scores, and determine “Pass” and “Fail” of the student.

- You can assume the user will input only numbers and 'q'
- The valid score is in range of 0 and 100 inclusively. If the user input the invalid score, the program will skip the loop and take a new input.
- If the user input 'q', the program will stop taking inputs and calculate the average of “valid” score.
- If the average score is more than 50, the program displays “Pass”; otherwise, the program displays “Fail”
- All output numbers are in 2 decimal places

Requirement: The program must use `while` loop

#### Sample inputs and output

#	Input	Output	Expected Screen Output
1	75 80 43 -5 90 55 q	68.60 Pass	75 80 43 -5 90 55 q 68.6 Pass
2	35 70	32.50 Fail	35 70

#	Input	Output	Expected Screen Output
	101 25 0 q		101 25 0 q 32.50 Fail
3	90 100 -11 200 q	95.00 Pass	90 100 -11 200 q 95.00 Pass

**Q5:** Write the program to count how many “Vowel” and “Consonant” user have inputs until they input '0'. The program must repetitively take the input alphabets until receiving '0'. Then, the program count how many vowels ('a', 'e', 'i', 'o' and 'u') and consonants (e.g., 'b', 'c', 'd', ...) and display the outputs.

- You can assume the user will input only the lowercase alphabets and '0'
- If users inputs '0', the program stops taking inputs and displays the output.

Requirement: The program must use loop

#### Sample inputs and output

#	Input	Output	Expected Screen Output
1	a b c 0	vowel:1 consonant:2	a b c 0 vowel:1 consonant:2
2	i i u 0	vowel:3 consonant:0	i i u 0 vowel:3 consonant:0
3	0	vowel:0 consonant:0	0 vowel:0 consonant:0
4	j y n x 0	j y n x 0 vowel:0 consonant:4	j y n x 0 vowel:0 consonant:4